Transportation Research Newsletter

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Website: http://www.state.me.us/mdot/planning/research/research.htm

Another Tire Shred Highway Application

Over the past few years the Maine Department of Transportation has been on the forefront of tire shred applications in highway construction. Thanks to research conducted by the University of Maine and to innovative thinkers here at MDOT, we have had numerous successes using tire shreds. The latest application should be no exception.

Along a Rt. 27 highway reconstruction project in Rome, Maine (not to be confused with Italy) tire shreds are being installed as a french drain. This section of Rt. 27 is built on the side of a fairly steep embankment with substantial amounts of surface runoff and subsurface water. Rather than design a typical open ditch that would have required costly right of way acquisition, removal of hundreds of trees, and significant excavation, the Department decided to install a drainage system that could collect both surface and subsurface water. A tire shred drainage system wrapped in fabric and placed under a shallow ditch was designed. Tire shreds are very permeable and have excellent thermal characteristics. It was felt that the drain would not freeze during cold weather which would provide an advantage over our typical underdrain systems. The drainage system is covered by heavy stone riprap and outlets into cross culverts which will carry the water away from the roadway.

To monitor the effectiveness of this tire shred drainage system, thermocouples have been installed to measure the temperatures within the tire shreds. Also stand pipes have been installed to allow for water flow checks. The system will be inspected during critical times of the year such as high runoff events and freeze-thaw periods. Documentation and reports will be prepared yearly for a minimum of five years.

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Roadway Subsurface Drainage Layers to be Debated By Presidential Candidates

We may never see this issue on any political party platform but Maine DOT is beginning to take it seriously. As a result of some recent experimental work completed on Maine DOT projects and a renewed interest in roadway subsurface drainage layers a workshop was held on March 3 for DOT and consultant personnel. Dr. Barry Christopher, a well known expert in the use of subsurface drainage systems, made two presentations on this topic. The first presentation was given to an upper management group. The second presentation was given to project managers and designers. Dr. Christopher presented work completed using geosynthetics, including drainage geocomposites, along Rt. 1A in Winterport. In fact, he had presented this work at the Transportation Research Board annual meeting in January. Also permeable gravel bases were discussed, similar to test sections completed along Rt. 139 in Fairfield.

Some "eye opening" facts shared by Dr. Christopher include the following. In the U.S., water in pavements is a $15 billion per year problem. If a roadway is saturated with water just five weeks every year there is a 50% premature roadway failure rate. Put differently, a roadway with a good drainage layer can double the service life. Constructing edgedrains as a retrofit can increase roadway service life by 40%. Excellent drainage layers can remove water at a rate of 1000 ft./day. Our average aggregate subbase permeability, based on work done by the University of Maine, is around 2 ft./day.

To maintain the momentum, geotechnical and research members have brainstormed numerous ideas for additional roadway drainage layer test sections and will be working with project managers from the Arterial Highway Program to include those test sections in upcoming projects. The response and support from project managers has been good. The intent is to evaluate the cost effectiveness and performance of roadway drainage layers. Constructability and maintainability of these drainage layers will be closely documented.

A thirty minute video of Dr. Christopher's presentation is available upon request

Roundabout Workshop

S u c c e s s

On April 11, a workshop on roundabouts was presented by Dr. Per Garder of the University of Maine. Dr. Garder has completed two roundabout studies for Maine DOT and has authored or co-authored other roundabout studies as well. The workshop was well attended by MDOT traffic, safety, and highway staff as well as consultants and FHWA.

The workshop covered lessons learned from the construction and before/after study of MDOT's first roundabout in Gorham. Also Dr. Garder presented information on crash reductions following installation of roundabouts in the United States. Twenty four U.S. Roundabouts were studied with a 39 percent overall decrease in crashes and a 76 percent decrease in crashes with injuries. Traffic delays were reduced by as much as 75 percent. Delays on the minor approaches of the Gorham roundabout were reduced by 80 percent during peak rush hours.

Another roundabout, located along Rt. 35 in Kennebunk, is currently being designed by Maine DOT.

Two excellent references on roundabouts can be found at the following websites:

www.highwaysafety.org for Status Report Vol.35, No.5, May 13, 2000, Insurance Institute for Highway Safety

www.tfhrc.gov/safety/00068.htm for FHWA's "Roundabout: An Informational Guide"

Bicycle Friendly Shoulder Rumble Strip

The Pennsylvania Department of Transportation has completed a study that identifies the most effective type of bicycle friendly shoulder rumble strip.

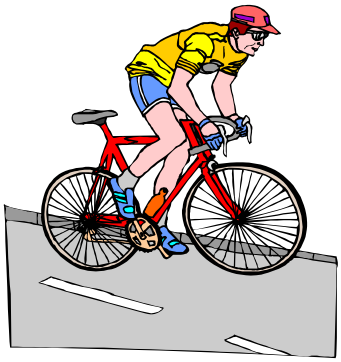
As stated in a PennDOT summary, "Shoulder rumble strips have proven to be an effective measure in reducing run-off-the-road (ROR) crashes on urban and rural freeways. ROR crashes may be reduced by as much as 20 to 50 percent when rumble strips are installed. As the use of shoulder rumble strips is extended to non-freeway facilities, bicyclists will encounter rumble strips more frequently in the future. Bicyclists are concerned about maneuverability problems while traversing rumble strips because they can be very uncomfortable to ride over and may cause loss of control of the bicycle."

Research was initiated to develop new rumble strip configurations that could alert inattentive or drowsy motorists and be safely and comfortably traversed by bicyclists. Two "test patterns" were selected and recommended for implementation along non-freeway facilities, one for higher operating speeds (55 mph) and the other for lower speeds (45 mph).

The Maine Department of Transportation will be using results of this study to field test shoulder rumble strips along non-Interstate systems. *Special thanks to PennDOT for this research and article!*

For more information please refer to PennDOT's High Payoff Research article on the following website:
http://www4.nationalacademies.org/trb/scor/states.nsf

For general information on rumble strips see the FHWA website:
http://safety.fhwa.dot.gov/programs/rumble.htm



Recent Publications & Upcoming Projects

Technical Report 00-7, Construction Report, Evaluation of Hot and Cold Crack Sealing Methods & Materials

Technical Report 97-20, Second Interim Report, Subsurface Drainage for Rehabilitation of PCC Pavements

Technical Report 99-11, First Interim Report , Innovative Solutions to Buried PCC Pavements

Technical Report 96-2, Third Interim Report, Hot Mix Asphalt Longitudinal Joint Study

Technical Report 00-18, Construction Report, Hot Mix Asphalt Longitudinal Joint Treatment

Technical Report 92-35, Final Report, Field Performance of a Reinforced Concrete Bridge Deck Using 45 Percent Less Reinforcement than Required by AASHTO. Ferry Hill Bridge; Orono, Maine

New England Transportation Consortium Project 97-3, Use of Wood Waste Materials for Erosion Control, April 2000

New England Transportation Consortium upcoming projects:

- Advanced Composite Materials for New England's Highway Infrastructure: A Synthesis of Technology and Practice
- Development of a Testing Protocol for Quality Control/Quality Assurance of Hot Mix Asphalt
- Design of Superpave HMA for Low Volume Roads
- Procedures for the Evaluation of Liquid-Applied Membrance Waterproofing
- Field Evaluation of a New Compaction Device
- Performance and Effectiveness of a Thin Pavement Section Using Geogrids and Drainage Geocomposites in a Cold Region

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